CLAIMS:

1. A non-resonance photo-neutralizer for neutral beam injectors comprising

first and second mirrors having opposing mirror surfaces, the first mirror including a mirror assembly comprising a central mirror and first and second outer mirrors coupled to the central mirror at a first end to the central mirror and axially extending in a first direction from the central mirror toward a second end with the distance between the first and second outer mirrors and the second mirror decreasing from the first end to the second end of the first and second outer mirrors, and wherein the mirror surface of the first mirror is concave in a second direction transverse to the first direction.

2. The photo-neutralizer of claim 1 wherein the photon trap is spherical, elliptical, or cylindrical in shape.

3. The photo-neutralizer of claim 1 wherein the first and second mirrors forming a photon trap in a confinement region adjacent a plurality of normals common to the opposing mirror surfaces of the first and second mirrors.

4. The photo-neutralizer of claim 1 wherein the mirror surface of the second mirror is flat.

5. The photo-neutralizer of claim 1 wherein the central mirror is cylindrically shaped and the outer mirrors are conically shaped.

6. The photo-neutralizer of claim 1wherein the photon trap having a storage efficiency, P/P_{in}, of approximately 1000 with a mirror reflectance of $\boldsymbol{r^2}$=0.999 for the first and second mirrors, and wherein the storage efficiency is defined as $\boldsymbol{P}/\boldsymbol{P_{in}} \approx \frac{1}{1-\boldsymbol{r}^2} \approx 1000$.

7. A negative ion based neutral beam injector comprising

a negative ion source, and

a non-resonance photo-neutralizer according to any preceding claim, wherein the non-resonance photo-neutralizer is co-axially positioned with the negative ion source.